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IN THE UNITED STATES PATENT AND TRADEMARKS OFFICE

APPLICANT: ROBERT FERNANDEZ SERIAL NUMBER : 09/993261

FILED: 11/14/01 GROUP ART UNIT: 2837

DOCKET NUMBER: F100128 EXAMINER: JIANG, CHEN WEN

FOR: VEHICLE AIR CONDITIONER WITH INVERTER

Commissioner of Patents and Trademarks

APPEAL BRIEF

(1) Real party in interest

Appellant

(2) Related appeals and interferences

None

(3) Status of Claims

Claims 1-2 are pending.

Claims 1-2 were rejected in the final office action of 1/14/03.

(4) Status of amendments filed after final rejection

Amendment filed with argument, but no claim amendment. Argument rejected.

(5) Summary of invention

(page 1, line 9) When large vehicles such as busses and trucks are air conditioned, the compressor is in the engine compartment where it is driven by an engine power take-off. The condenser and air handler may be remote from the engine. The fans for these components are run off the vehicle DC power. The DC motors for these fans are large, expensive, and require frequent service, especially for brush replacement. It would be desirable to be able to employ more compact and less expensive motors that are low in maintenance requirements.

It is accordingly an object of the invention to provide a means for driving fans for the condenser and air handler of a vehicle that are compact, low cost, and low in maintenance requirements. The apparatus of the invention comprises a direct current (DC) to alternating current (AC) inverter that receives DC power from the vehicle electric supply. The DC power is converted to AC power. This enables the system to use inexpensive, reliable AC motors to drive the fans. In a preferred embodiment, the AC frequency produced is high, such as 400 hz. At higher frequencies, the size of the motor for a given horsepower is reduced. The motor may be of the type without brushes that requires very little maintenance. The inverter may be of the variable frequency type, when it is desired to vary the speed of the fans by varying the frequency. The system may employ 60 hz to enable use of very inexpensive motors that are readily available.

(page 2, line 5) Referring now first to Fig.1, the cooling system 1 for a vehicle having an engine 2 and a low voltage dc power supply 3 has a compressor 4 driven by the engine. The compressed refrigerant goes to condenser 5 and then evaporator 6 before returning to the compressor in a conventional refrigerant cycle. A condenser fan 10 cools the condenser. An AC motor 11 drives the fan 10. An evaporator fan 12 blows air through the evaporator to provide cool air to the air space 16 being cooled. An AC motor 13 drives fan 12. Both AC motors 11

and 13 are powered by the AC output 9 from the DC to AC inverter 7 that is powered by the low voltage DC electric supply 3 connected at the inverter input 8. The AC motors may be of the sort readily available inexpensively and much more maintenance free than their DC counterparts. In addition, they may be more compact. As the frequency of a motor increases, the size decreases. Referring now to Fig. 2, the system 14 features a variable frequency inverter 17 and a thermostat 15 in the air space 16 being cooled. The thermostat regulates the output frequency of the inverter. The motors 11' and 13' rotate at a speed related to the frequency of the input current. This system provides an elegant means of temperature regulation.

6) Issues

Should claims 1 and 2 have been rejected under 35USC 103(a) as being unpatentable over Matsuda et al. (US Patent 4,870833)?

(7) Grouping of claims

Claim 1 relates to a system with a DC/AC inverter to power air handling fans for condenser and evaporator. It stands separate from claim 2, which employs a variable frequency inverter for varying fan speed for temperature regulation.

(8) Argument

Examiner's rationale

Claims rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda '833 which discloses a car air conditioning apparatus and controlling method. Referring to Fig. 4, the system comprises an engine, a compressor, a condenser, an evaporator, an inverter 11b for regulating a frequency of the power generated by the generator and fed to the compressor, and an inverter 11c for regulating a frequency of the power generated by the generated and fed to the condenser and evaporator blowers. An objective of '833 is to provide a car air conditioner capable of securing a

steady air conditioning capacity regardless of any fluctuation in speed of an engine or power source. In the prior art, bus or vehicle comprises an open type compressor unit driven directly by the main engine, a condenser connected to the compressor, an expansion valve, an evaporator, a condenser blower, an evaporator blower. The speed of the compressor driven by the engine sharply fluctuates likewise as in the case of the main engine. Therefore, it would have been obvious to one of ordinsary skill in the art to select the claimed inverter for the control the blower speed since this arrangement has provided no better or improved performance over that which is commonplace in the prior art. Also, it would have been obvious to one of ordinary skill in the art to select the AC driven blowers only if the compressor performance is not a concern.

APPELLANT'S RESPONSE

It is respectfully submitted that the application is improperly rejected for want of a prima facie showing of obviousness.

Appellant's specification reveals that improved performance from his claimed arrangement comes from the fact that AC blower motors are much lower in initial cost. Furthermore, they don't incur high maintenance costs associated with brush replacement characteristic of DC motors (specification page 1, lines13,18). Appellant has found that brush replacement problems in vehicles such as buses are complicated by the fact that the drivers work in shifts on available buses, accepting little maintenance responsibility. Consequently, maintenance is delayed with failure and costly out of service time. The AC motors have lower initial cost and low maintenance with no brushes. Furthermore, controlling motor speed by frequency control of AC motors is very efficient, compared to speed control of DC motors.

However, the combination taught by Matsuda would be very cost ineffective as well as being opposite teaching. Driving the compressor of a vehicle air conditioner requires many

horsepower. To adopt his teaching of driving the compressor from an AC motor rather than from a simple belt to the engine requires buying a very expensive large and bulky motor. Applicant's simple belt and pulley is cheaper for driving the compressor, and far more energy efficient. Taking so much power from the engine through a belt and pulley to a generator, then driving the compressor with that generator power causes energy losses at each step of Matsuda combination. His teaching of not letting the engine speed control the compressor speed is further opposite teaching and results in a completely different function. Vehicles running at high speed have inherently greater air conditioning requirements. By driving the compressor directly off the engine, applicant's combination provides a different means of compressor control that inherently responds to the load requirements. Examiner's suggested combination of running the '833 system, but with the compressor run off a pulley/ belt from the motor would no longer function as '833 intended, since the compressor would no longer run at constant speed regardless of engine speed.

Although '833 discloses the use of an inverter fed by a generator to power both the evaporator fan motor and the condenser fan motor, their system also feeds inverter power to the compressor motor ("the compressor 12 is not driven directly by the main engine 2", column 3, line28). In fact, one of the objectives of their construction is to use the type of sealed compressor that includes an integral electric AC motor ("using a compressor 12 of the hermetically sealed type with the driving motor and the compressing mechanism within a casing", column 3, line52). Another objective is to isolate the compressor speed and output from the engine rotation speed by driving it with an electric motor, (" where the engine speed drops, a speed of the compressor12 and the others can be kept as rated there around."(column 3, line 32).

No teaching or suggestion is made in '833 that compressor be driven by the engine so that its speed is determined by the engine speed. Applicant's claim elements could not function with the proposed prior art combination since their compressor is not driven by the engine.

There has been no teaching or suggestion to modify the prior art, and the suggested combination would not work as intended by '833.

Since the prior art combination lacks elements of the claims, are opposite teaching, and do not function as intended, it is therefor unobvious. In re Clinton, 527 F. 2d, 188 USPQ365 (CCPA 1976)

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 947 F.2d 488, USPQ 2d 1438 (Fed.Cir. 1991).

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

The showing of suggestion to combine must be clear and particular. Examiner has made no such showing. In re Dembiczak, 175 F.3d 994, 50 USPQ 2d. 1614 (Fed. Cir.1999).

For the foregoing reasons, it is submitted that the examiner's rejections are erroneous, and reversal of his decisions is respectfully requested.

Respectfully submitted,

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(9) Appendix

Claims on appeal

1. A cooling system for a vehicle having a low voltage DC electric supply and an engine, the cooling system comprising:

a) a compressor driven by the engine, so that the speed of the engine determines the speed of the compressor;

b) a condenser connected to the compressor;

c) an evaporator connected to the condenser and the compressor;

d) a DC to AC inverter connected to the low voltage DC electric supply;

e) a first AC powered fan connected to the AC output of the inverter for cooling the condenser; and

f) a second AC powered fan connected to the AC output of the inverter for circulating air through the evaporator and the space being cooled.

2. The cooling system according to claim 1, in which the inverter is capable of providing a variable frequency output, and at least one of the first AC powered fan and the second AC powered fan have motors whose speed is related to the frequency of the AC power for temperature regulation.